APN1 and APN2 encode multi-functional enzymes involved in the repair of damaged bases in DNA. Both Apn1p and Apn2p possess an apurinic/apyrimidinicendonuclease activity, a 3'-diesterase activity, and a 3' to 5' exonuclease activity. However, Apn1p constitutes the major apurinic/apyrimidinicendonuclease and 3'-phosphodiesterase in vivo, constituting close to 97% of these activities. During base excision repair, the AP-endonuclease activity nicks the 5' side of abasic sites that are generated by the removal of oxidized and alkylated bases. This creates a single-strand break that contains a 3' hydroxyl group in preparation for DNA synthesis. The 3'-phosphodiesterase activity is able to remove a wide range of 3' moieties at end of single-strand breaks in order to generate a 3' hydroxyl group. The 3' to 5' exonuclease activity removes single nucleotides at a nick, such as 8oxodGMP that is mispaired with adenine/cytosine, leaving a single-nucleotide gap.APN2 represents an alternate pathway for the repair of abasic sites. Although the methyl-methane sulfonatesensitivity of apn2 single mutant strains are similar to wild-type strains, an apn1 apn2 double mutant is extremely sensitive. APN2 expression is induced six-fold in response to MMS.Apn2p has sequence similarity to E. coli exonuclease III, S. pombe Apn2, and human Ape1 and Ape2.